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ABSTRACT

Recognizing the need of all students for awareness of nature and functions of the computer in modern society, as well as computer literacy for those specializing in specific major fields, this guide was developed to aid secondary school teachers in determining how to integrate computer education in their courses. The first of the five goals presented addresses the general need for awareness for all students; remaining goals are concerned with both awareness of and involvement in computer applications in specific areas--the business field for all business students, the academic subject areas for all college-bound students, and more specialized applications for social-science oriented and science and mathematics oriented college-bound students. Educational and specific instructional objectives, suggested activities, strategies, topics, and notes are provided for each goal. A flow chart is included for determining which goals are applicable in specific courses. Appendices include lists of films and simulation activities relevant to specific academic areas which could be used to help meet these goals and objectives. (CHV)

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COMPUTER EDUCATION GUIDE

August, 1976

NEWARK SCHOOL DISTRICT

NEWARK, DELAWARE

Dr. George V. Kirk, Superintendent
Dr. John E. Allen, Deputy Superintendent
Dr. Keith E. Stapley, Assistant Superintendent

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FOREWORD

Computer education has been a part of the high school curriculum in the Newark School District for several years. With the addition of a third high school and expanded computer facilities in all high schools, the need for a formal guide became apparent. Thus, a committee of Newark staff members developed this guide as an aid for teachers and administrators when planning computer education experiences for students.

Due to the dynamic nature of computer technology and applications, computer education must continually be revised. You are encouraged to record comments at appropriate points in this guide to aid in evaluating and improving its content. Please forward your suggestions for improvement to the Computer Education Committee. Your comments, pro and con, will be most welcome and will facilitate future refinement and expansion of the guide.

Loren J. Thompson
Director of Instruction

INTRODUCTION

A wide array of scientific, economic, social, and technical factors are reshaping our world, and, with it, the course of modern education. One such technological development is the computer which is being utilized extensively and is playing a pervasive role in modern society. Banking, business, communication, transportation, engineering, medicine, and social and scientific research are examples of areas which are increasingly dependent upon the computer's speed in problem solving and capacity for handling vast amounts of data. In addition, the computer is fast becoming a significant tool in the administrative and instructional processes of education.

The President's Science Advisory Committee said that since the computer is such a valuable and versatile tool in society, students attending school in the 1970's who have not been exposed to knowledge about computers will be poorly prepared for the world of the 1980's and 1990's. Although most school students will not be computer technologists, the influence of the computer on their future is so important that they should be made aware of its nature and function.

Recognizing that all students have a need for computer awareness and many require additional computer literacy, a committee of District staff members

was appointed to develop a guide for computer education in the Newark School District. The purpose of this guide is to provide direction to teachers in meeting these needs of students. Although the individual schools may operate different programs, the guide provides for a unified computer education theme aimed toward common goals. As a secondary school staff member, you should become familiar with the guide to determine which goal(s) are applicable in your present courses. When considering each of your courses, the following flow chart may be helpful.

A decimal outline system has been used in this guide with the numbers to the left of the decimal point representing the major goals. To the right of the decimal, two significant places have been used. The tenths place has been assigned to the educational objectives and the hundredths place to the instructional objectives.

There are many ways each objective might be met and teachers are encouraged to modify and add to the suggested activities and strategies from their own experiences.

Credit for the production of this guide goes to several classroom teachers as well as other interested educators. Staff members who assisted in its

preparation, either through writing or by participating in workshops, include:

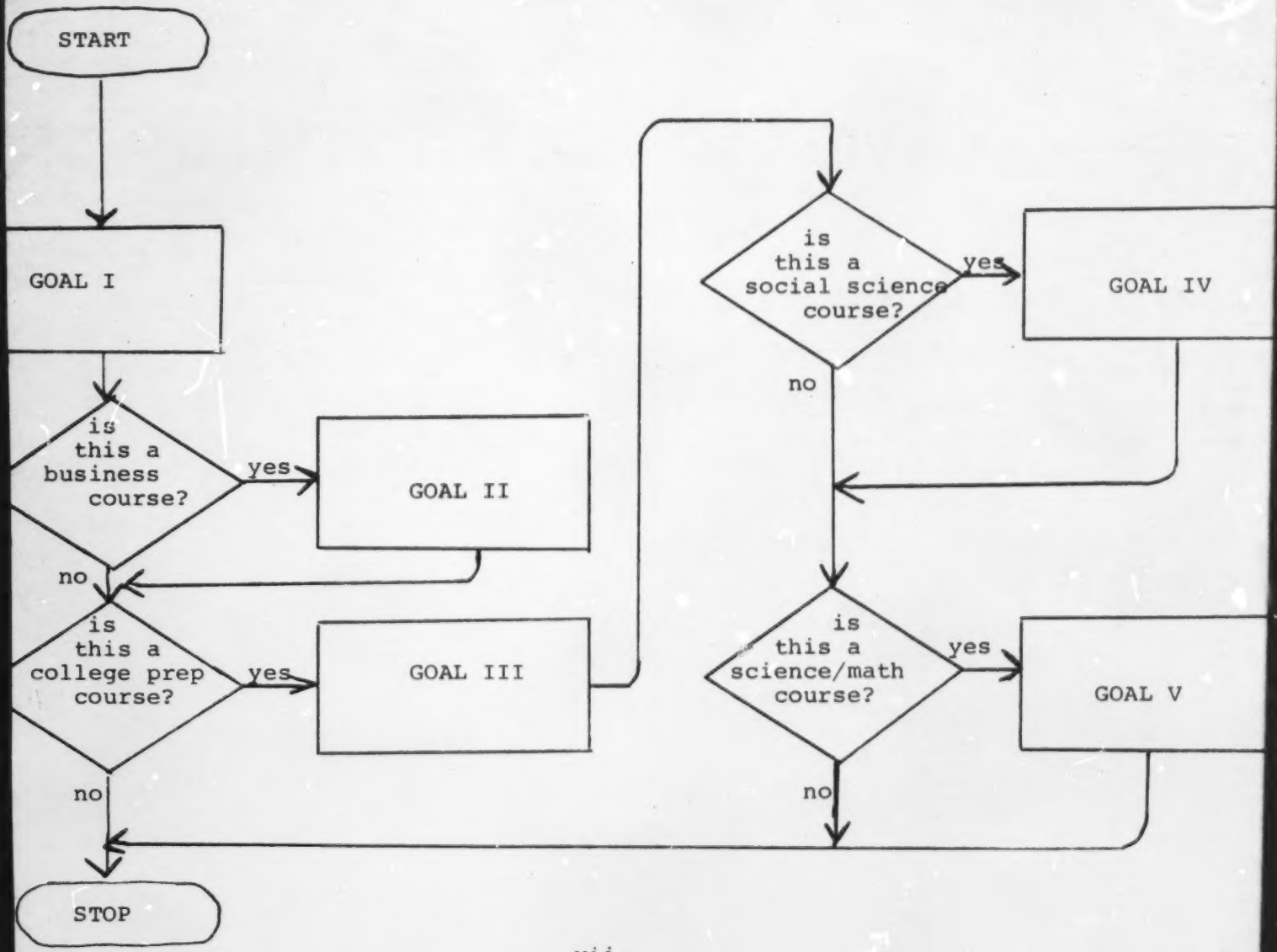
Donald Allen	Rebecca Feikls	Ted Miller
John Baldino	Frank Hagen	Steven Palmer
Liza Bartle	Ronald Hull	Darrell Pelley
Thomas Concavage	Carl Jacobson	Edwin Stowell
	Kenneth Klimek	

Consultants: Dr. William Geppert
State Supervisor of Mathematics, DPI

Dr. F. Neil Walzl
Supervisor of Mathematics, Newark School District

Dr. David Yens, University of Georgia

FLOW CHART FOR DETERMINING COURSE(S) IN WHICH COMPUTER GOALS SHOULD BE ACCOMPLISHED



GUIDE FOR COMPUTER EDUCATION

GOALS FOR COMPUTER EDUCATION

GOAL NO. 1 — ALL STUDENTS SHOULD BECOME AWARE OF THE COMPUTER-ORIENTED SOCIETY IN WHICH THEY LIVE

GOAL NO. 2 — ALL BUSINESS STUDENTS SHOULD BE AWARE OF AND INVOLVED WITH COMPUTER APPLICATIONS IN THE BUSINESS FIELD

GOAL NO. 3 — ALL COLLEGE-BOUND STUDENTS SHOULD BE AWARE OF AND INVOLVED WITH COMPUTER APPLICATIONS IN ACADEMIC SUBJECT AREAS

GOAL NO. 4 — ALL SOCIAL SCIENCE ORIENTED COLLEGE-BOUND STUDENTS SHOULD BE AWARE OF AND INVOLVED WITH COMPUTER APPLICATIONS IN THE STUDY OF SOCIETY

GOAL NO. 5 — ALL SCIENCE AND MATHEMATICS ORIENTED COLLEGE-BOUND STUDENTS SHOULD BE ACTIVELY INVOLVED WITH COMPUTER APPLICATIONS AND COMPUTER PROGRAMMING

GOALS AND ACTIVITIES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
1.14 State specific limitations of computer usage.	Topic: Artificial intelligence	Computers still lose to human chess players
1.20 Each student will be provided with a knowledge of the cultural and social impacts of computers and automation.		These objectives are especially appropriate to the social science curriculum.
1.21 State several ways the computer affects the labor market	Strategies: Those listed under 1.10	
1.22 State several ways the computer affects the consumer.	Topics: Automation replacing manual labor, automatic bank teller, computer revolution, need for increased skills for employment, cashless society, Arco self-service stations, computerized checkout (Sears, Basco, grocery stores), reservation systems (airlines, Ticketron), establishment of data banks containing personal records	
1.23 State several ways the computer affects leisure time.		
1.24 State several ways the computer affects constitutional rights and depersonalization		
1.30 Each student will be acquainted with computer-related careers		All teachers should strive to make students aware of employment potential in the computer field
1.31 Identify and describe several computer involved occupations	Strategies: Those listed under 1.10	Career guidance personnel could be an invaluable resource for this objective

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
1.00 All students should become aware of the computer oriented society in which they live.		The objectives under Goal I should be met in existing courses in all subject areas and grade levels. These are not intended to replace course objectives; rather they should be met in conjunction with existing course content. Within the content of existing courses, efforts should be made to provide students with a hands-on computer experience.
1.10 Each student will be made aware of the utilization of computers in today's society.		Teachers should continually seek opportunities to increase student awareness of computer utilization in their field.
1.11 State specific examples of computer usage in industry.	Strategies: Inquiry discussions Guest speakers Films Student surveys or reports Visual displays	Contact ERA for potential speakers. See Appendix A for annotated film list.
1.12 State specific examples of computer usage in the business world.	Topics: Process control, quality control, sales and financial accounting, employee payroll, inventory control, management information systems, student grade reports, student scheduling, student records, student busing, medical research, ecological research, astronomy, space and earth technology research, language translation, literary works analysis, music analysis, graphic arts.	Inquiry discussions and visual displays can be extracted from articles in current periodicals and sample computer printouts.
1.13 State specific examples of computer usage in research.		

GOALS AND ACTIVITIES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
1.32 State compensations and advancement possibilities in several computer involved occupations.		Refer to occupations such as law enforcement where a patrolman may use computer assistance in vehicle identification or a doctor might use computer analysis in diagnosis.
1.33 Identify and describe several occupations in the computer industry		Refer to occupations in the design, manufacture, marketing, programming, operation and maintenance of computers.
1.34 State compensations and advancement possibilities in several occupations in the computer industry		Classified ads in newspapers and professional publications provide current information on opportunities, advancement, and compensation
1.35 State various methods for entering computer related careers.		

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
2.00 All business students should be aware of and involved with computer applications in the business world		Typing I, being the only common course of all business students, could be used to meet this goal and its objectives. All typing classes could take one week out of their regular classwork to familiarize themselves with computers. Only one typing class per week would be involved in the computer program
2.10 Each student will be acquainted with business applications of computers		
2.11 Describe types of information that can be used by data processing systems	Strategies: Inquiry discussions Guest lecture Visual displays	Should be touched on in Typing I.
2.12 Describe types of results obtainable from data processing systems	Topics: Payroll records - paychecks inventory data - inventory control, charge slip - charge account bills - management information systems	
2.20 Each student will be provided with knowledge of data processing machinery and terminology		
2.21 Describe various computer input devices	Strategies: Inquiry discussion Guest lecture	Should be touched on in Typing I and developed to a greater depth in Bookkeeping I and Business Machines.

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
2.22 Describe various computer output devices		
2.23 Describe the processing unit of the computer		
2.24 Describe various computer storage devices	Film/filmstrip	See Appendix A, "All the Facts"
2.30 Each student will be provided with knowledge of an available computer system through "hands-on" experiences		
2.31 Identify limitations and capabilities of the specific computer used.	Strategies: Hands-on experiences with computer Demonstration lesson	
2.32 Demonstrate correct usage of the computer through "hands-on" experiences.	Topics: Computer commands: on-off, clear, load, run, select	
2.33 Employ existing simulation and problem-solving programs.	Existing programs: Fast Market	
2.34 Operate a variety of input/outpout devices		As a follow-up to the one week Typing I experience, all Typing I students could be involved in: 1. Field trips A. DICE (Data Information Center for Education)

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
		B. Bank (24 hour teller, etc.) C. Telephone Company D. I.B.M. E. DuPont F. U. of D. 2.Guest lecturer A. Systems analyst from local business B. Instructor of school computer courses 3.Films/Filmstrips (See Appendix A)

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
3.00 All college-bound students should be aware of and involved with computer applications in academic subject areas		The objectives under Goal III should be met in existing college prep courses. Students aspiring to attain a greater knowledge of computers should be encouraged to enroll in computer courses
3.10 Each student will have an understanding of a variety of computer applications	Strategies: Inquiry discussions Guest speakers Field trips Films Student survey or reports Computer demonstration Visual displays	Contact ERA for potential speakers and field trips See Appendix A for annotated film list. Encourage students to prepare computer oriented reports which will satisfy requirements for other classes.
3.11 Describe examples of computer applications	Topics: Student grades, records, scheduling, financial analysis, payrolls, inventory control (Basco, Sears), billing (phone, power, credit) process control, transportation (airline, Ticketron, rail freight scheduling), space flight Control, telephone dialing system	Although 3.11, 3.12, 3.13, are listed as separate objectives, they are probably brst met simultaneously. That is, discuss advantages and limitations of using the computer as each application is identified.
3.12 Identify advantages of computer applications		
3.13 Identify limitations of computer applications	Topics: Non-thinking, does only what programmed to do, can work only on data given it, expense, computer-related crimes, security of private information.	
3.20 Each student will be provided with knowledge of computing machinery and terminology		

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
3.21 Describe various computer input devices	Strategies: Same as those listed under 3.10	Discussion might well include historical development of devices
3.22 Describe various computer output devices		
3.23 Describe the computer processing unit		
3.24 Describe various computer storage devices		
3.30 Each student will be provided with knowledge of an available computer system through "hands-on" experiences.		
3.31 Identify limitations and capabilities of the specific computer used.	Strategies: Utilize existing simulations, library, and utility programs	Simulations exist which may be particularly applicable to common science courses.
3.32 Demonstrate correct usage of the computer through "hands-on" experiences.		See Appendix B
3.33 Employ existing simulation, problem solving and basic research programs		
3.34 Operate a variety of input/output devices		
3.40 Each student will have experiences in simple programming		Objectives 3.41, 3.42, and 3.43, should be met in a variety of college prep courses

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
3.41 Write an elementary flowchart for a problem	Topics: Approximating n^{th} roots, arithmetic and geometric progressions, interpolation and extrapolation, distance between two points, shape of line containing two points	Many beginning algebra algorithms provide opportunities for students to generate simple computer programs
3.42 Demonstrate a knowledge of a computer programming language		
3.43 Write and execute a computer program to solve a specified problem		

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
4.00 All social science oriented college-bound students should be aware of and involved with computer applications in the study of society		Suggested for study in economics, political science, sociology, American studies, and world studies courses
4.10 Each student will have an understanding of why and how computers are used as "tools" for the social sciences	Strategies: Discussion Lecture Problem-solving Brainstorming Film/filmstrip Guest speakers Visual displays	 See Appendix A for annotated film list. U. of Delaware professors
4.11 Identify the role of the computer as a research and modeling tool in the social sciences.	Topics: Improved speed and accuracy in analyzing social problems, ability to handle large amounts of information.	Students in advanced computer courses are available to provide technical assistance in modifying existing programs or creating new programs
4.12 Describe computer applications for research and modeling in the social sciences	Organizing and presenting demographic studies, mapping archeological dig sites, sales and revenue projection, hypothesis testing	
4.20 Each student will be provided with opportunities to use an available system for social science applications		
4.21 Employ existing or original simulation and research programs	Strategies: Utilization of existing simulations and data base programs. Development and execution of original problem solving programs	

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GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
	Topics: Existing programs Economics: MARKET, ONIONS LABOR, CROSS, CROSSE, BALANC, CIRFLW, CONSME, GNPSUM, INOUT, MANAGE Political Science: POLSYS, POLICY, GVOTE, COMUNE, MASPAR, ELECT, ECPRESS, JUDGE Sociology: ECPRESS, FORMAT, ECPSUV, ECPSUR American Studies: CIVWAR, ELECT1, ELECT2	See Appendix B

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
5.00 All science and mathematics oriented college-bound students should be actively involved with computer applications and computer programming		The objectives to Goal V should be met in existing upper division math and science courses. However, these students should be encouraged to enroll in computer education courses to attain the depth of exposure desirable in an adequate pre-college experience
5.10 Each student will be provided opportunities to use sophisticated programming techniques		
5.11 Translate a variety of mathematical expressions into computer language and vice versa		
5.12 Formulate and refine algorithms to efficiently solve problems		
5.13 Construct flowcharts for given algorithms	Topics: both macro and micro flowcharts	Flowcharting is a good technique for teaching problem-solving in many areas
5.14 Demonstrate a thorough knowledge of a programming language		I.E. Include advanced statements such as ON-GO TO, GO SUB, DEFFN
5.15 Demonstrate an ability to execute and debug programs		I.E. Use EDIT, TRACE, HALT/STEP
5.16 Employ appropriate documentation procedures		User and/or programmer documentation

GOALS AND OBJECTIVES	SUGGESTED ACTIVITIES STRATEGIES/TOPICS	NOTES
5.20 Each student will be provided the opportunities to apply computer programming techniques in a variety of situations and subjects		These objectives would likely be met in independent study situations
5.21 Adapt existing computer programs		Students could tailor existing programs to meet needs of specific courses or teachers or modify them to run on other systems
5.22 Write a special program(s) for solving problems arising from any subject area		
5.30 Each student will have an understanding of other computer systems and languages		
5.31 Demonstrate an awareness of other computer systems	Strategies: Field trips Guest speakers Films Visual displays reports	University of Delaware (Burroughs, PLATO, DELTA) West Chester State duPont Hewlett-Packard
5.32 Compare and contrast computer languages		Sources for reports are: reference books, periodicals (Creative Computing, Computerworld), and computer language manuals
5.33 Access other computer systems	Hardware demonstrations	Vendors University of Delaware

APPENDIX A

This appendix contains a brief listing of films which could be used to meet various computer education goals and objectives. The rental price, if any, has probably gone up, and the source of information is subject to change. Also, some sources may not serve our area. Therefore, users of this computer education guide are encouraged to forward any information pertaining to films found useful in the classroom to the Computer Education Committee for inclusion in future revisions of the guide.

Film Title and Description	Goal or Objective

A Customer is a Customer is a Customer 10-A..... 2.00
Motion picture. 30 min. Color. 16mm.
The story of NCR's Central Information File for banks. Designed to show how CIF affects banks and their customers. Available from: NCRC. Rental: Free.

All the Facts 10-A..... 2.20
Motion picture. Color. 9 min. 16mm.
A case history of how one small businessman achieves the benefits of help by utilizing the services of a data processing center.
Available from: NCRC. Rental: Free.

America: On the Edge of Abundance..10-A..... 1.2
Motion picture. 60 min. B & W. 16mm
British television explores the far-reaching economic and social consequences of the increasingly automated and computer-oriented society in the U.S.
Available from: OCEP. Rental: 8.40.

Automation 10-A..... 2.00
Motion picture. 28 min. B & W. 16mm.
Under the guidance of automatic control research engineers, a survey is made of laboratories doing pioneer work in the development of new machines designed to assume some of the duties once performed only by humans.
Availabe from: UNIW. Rental: 6 00

The Bank 10-A..... 2.00
Motion picture. 19 min. Color. 16mm.
A detailed presentation of Demand Deposit Accounting using the Programmed Applications Library approach on the IBM 1419/1401 Tape System. It includes demonstrations on the 1401 system, 1?10 Proof Inscriber, and 1203 Unit Inscriber, showing all accounting management reports.
Available from: INBM. Rental: Free.

A Better World 10-A..... 1.10
Motion picture. 8 min. Color. 16mm.
A film describing the influence of computers in our daily lives. A fast montage of applications covering a very broad range of subjects including education, medicine, traffic control on the ground and in the air, space research, law enforcement, and the general business community.
Available from: INBM. Rental: Free

Careers in Computer and Data Processing 10-A..... 1.30
Motion picture. 15 min. Color. 16mm
Produced for the Automation Institutes of America, this film explores the constantly growing needs of, as well as the variety of opportunities open in, Science, Business, and Industry for trained computer personnel. Further answered is the question of how today's young man or woman enters into this challenging computer field.
Available from: CDCO. Rental: Free

Appendix A (Cont.)

Close Up 10-A..... 1.10
Motion picture. 21 min. Color. 16mm.
A documentary look at IBM, its people and their views of the technology with which they are working. A cinema verite film produced by Roman Kroitor, producer of "Labyrinth" for Expo 67. Included are glimpses into real life applications of computers in education, medicine, space, and textile design.
Available from: INBM. Rental: Free.

The Computer 2-6..... 1.10
Motion picture. 11 min. Si. Color. 16mm. Guide.
Provides an understanding of what kind of machine the computer is and how it works with information to help us in many areas of our modern world.
Available from: LANE. Rental: Free

The Computer at Work 9-12..... 1.10
Motion picture. 12 min. Color. 16mm.
Views the computer under actual working conditions -- helping produce toys, improving instruction techniques in schools, helping to launch space ships, etc. Film offers the kind of realism that is so important in emphasizing computer studies and relating those studies to work.
Available from: MCID. Rental. Free.

Computer Flow Charts 7-12..... 3.41 - 5.13
Film loop. 8 mm. Si. Color. 4 min.
Organizes a simple problem into a flowchart similar to those used by computer programmers and solves the problem by following the flowchart.
Availabe from: BELT. Rental: Free/

Computers and Human Behavior 10-A..... 4.00
Motion picture. 29 min. Sd. Color. 16mm.
Focus on behavior series. Research and experiments with electronic digital computers seeking to discover ways in which man thinks.
Available from: LIED OCEP. Rental: Free

Appendix A (Cont.)

The Computer Revolution 7-A..... 1.10
Motion picture. 23 min. Sd. Color. 16mm. Guide.
General introduction to the computer, emphasizing its present uses and its potential for the future.
Available from: LIED. Rental: Free.

Computer Systems in Personnel Accounting 10-A..... 2.00
Motion picture. 23 min. Color. 16mm.
This is the story of the acquisition and application of ADPS in the 4th U.S. Army in the area of personnel accounting.
Available from: USAR. Rental: Free

Digital Computer Techniques: Computer logic 12-A..... 3.40, 2.20
Motion picture. 13 min. Sd. Color. 16mm.
Defines several meanings of logic, shows the difference between the decimal and binary number systems, and explains how binary numbers are constructed and how arithmetical operations are performed with them.
Available from: LIED. Rental: Free

Digital Computer Techniques: Computer Units 12-A..... 3.40, 2.20
Motion picture. 24 min. Sd. Color. 16mm
Describes the input unit and how it reads the problem data, the output unit and how it delivers problem solutions, the arithmetic unit and how it works, and the function of the control unit.
Available from: LIED. Rental: Free.

Digital Computer Techniques: Introduction 12-A..... 3.40, 2.20
Motion picture. 16 min. Sd. Color. 16mm.
Explains historical origins of calculating devices; differences between analog and digital computers; and principal steps involved in solution of problems subjected to the computer.
Available from: LIED. Rental: Free

Digital Computer Techniques - Logic Element Circuits 10-A... 3.40, 2.20
Motion picture. 20 min. Color.
The film shows the application of solid-state electronic devices to computer circuits. A general discussion of AND and OR gates and their operation precedes the explanation of transistors. The use of transistors in the gates is covered. Shows the handling of binary information in the form of different voltages. The inverter, NOR gate and flip-flop circuitry is discussed. While the illustrations are good, the film should have an extensive supplementary elaboration by a scientific or technical person, or should be shown to an audience with that background.
Available from: USNA. Rental: Free

Digital Computer Techniques: Programming 12-A..... 3.40, 2.20
Motion picture. 14 min. Sd. Color. 16mm.
Defines computer programming, explains how to analyze a problem: shows how a simple flow chart is prepared and how instructions to the computer are encoded in computer language.
Available from: LIED. Rental: Free.

Early Warning 10-A..... 1.00
Motion picture. 25 min. Color. 16mm.
The Veterans Administration Hospital, in Minneapolis, Minnesota, now has one of the most extensive computerized patient-monitoring setups in the nation. A Control Data 3300 computer, by performing separate functions simultaneously, is assisting the V.A. Hospital staff in saving lives. While the computer is analyzing monitored data from patients in the intensive care ward, it is also continually calculating, during surgery, the patient's cardian output and other vital information.
Available from: CDCO. Rental: Free.

Engine at the Door 10-A..... 1.00
Motion picture. 29 min. B & W. 16mm.
Computer and the mind of man series. Discusses question of will machines ever run man. Points out that the wise and beneficial use of science and technology is man's responsibility.
Available from: OCEP. Rental: 5.00.

The Green Light 10-A..... 2.00
Motion picture. 14 min. Color. 16mm.
A contemporary look at the modern computerized office. Comparison of old and new methods of gathering and storing information. Stresses the usefulness of learned skills in pursuing an office career.
Available from: BUEF. Rental: 14.00

Guidance and Navigation 10-A..... 1.00
Motion picture. 6.5 min. 16mm.
Presents a report of the intricate problems of guiding the American astronauts on their voyages and the ways in which these problems are solved. Shows the special techniques used to guide vehicles and spacecraft from earth to the moon and back.
Available from: NASA. Rental: Free.

How to Succeed Without Really Flying 10-A..... 1.00
Motion picture. 28 min. 16mm.
Young FAA air traffic controllers, men and women, tell it like it is in this unusual behind-the-scenes look at one of aviation's most challenging careers. Actual controllers star in this film that describes what air traffic control offers as a profession, and how it provides rapid career advancement, professional status, high pay, and a rewarding sense of personal achievement. Especially recommended for television, high schools, colleges, and military separation centers.
Available from: FEAA. Rental: Free.

Impulse '90 10-A..... 1.22, 2.00
Motion picture. 25 min. 16mm.
A look at the cashless and checkless world of the future with a Universal Credit Card handling all spending and borrowing transactions using a computer.
Available from MODT. Rental: Free.

Appendix A (Cont.)

Input/Output 7-12..... 3.20, 2.20
Film loop. 8mm. Si. Color. 4 min.
Shows several devices for conveying information into and out of computers: punched cards, magnetic tape, microfilm and cathode ray tubes.
Available from: BELT. Rental: Free

Introduction to Digital Computers 7-A..... 3.20, 2.20
Motion picture. 24 min. Color. 16mm.
Shows what a computer is and how it works and what good it does. Animation explains input, control, arithmetic, memory and output--the five basic computer parts.
Available from: UVAC. Rental: Free

It's Your Move 10-A..... 2.00
Motion picture. 15 min. Color. 16mm.
A film describing the Electronic Accounting System for automotive dealers. Scenes were filmed on location at the pilot installation and show the equipment in operation, the reports generated by the system, data center operations, and customer training.
Available from: NCRC. Rental: Free.

JOSS: Johnniac Open Shop System 10-A..... 5:30
Motion picture. 22 min. 15 mm.
Demonstrates an on-line time-shared system under development.
Available from: RANC. Rental: Free.

Man and Computer..A Perspective 10-A..... 3.20
Motion picture. 20 min. Color. 16mm.
A primer on some of the basic elements in data processing, such as input, output, storage and control. These are explained in detail in both live action and animation, with examples showing how they work and what functions they perform. In addition, the binary system is illustrated and defined in an understandable and graphic manner.
Available from: INBM. Rental: Free

Memory Devices..... 3.21
Motion picture. 28 min. Color. 16mm.
Shows information storage devices used in modern computing machine memories. Explains how binary information is stored.
Available from: BELT. Rental: Free.

Modern Merchandise Management 10-A..... 2.00, 2.20
Motion picture. 23 min. Color. 16mm.
An audio-visual report on the use of retail classification systems combined with edp.
Available from: NCAR. Rental: Free.

NCR 315 Data Processing System 10-A..... 5.31
Motion picture. 25 min. Color. 16mm.
A complete description of the features and operation of the 315 computer system.
Available from: NCRC. Rental: Free.

NCR 390 Data Processing System 10-A..... 5.31
Motion picture. 20 min. Color. 16mm.
A complete description of the features and operation of this computer system.
Available from: NCRC. Rental: Free.

NCR 420-1 Optical Character Reader 10-A..... 5.31
Motion picture. 18 min. Color. 16mm.
This film describes the Optical Reader and its operation, and demonstrates how the 420 functions in an EDP system.
Available from: NCRC. Rental: Free.

1999 (House of Tomorrow) 10-A..... 5.31
Motion picture. 35 min. Color.
Sponsored by Philco-Ford, the film has some commercial aspects. It shows a family of 3 and how their life might be lived in 1999, including education, health, recreation, occupation, and home life. Emphasizes the technological inventions which serve the people.
Available from: CINW, MCID. Rental: 5.00.

Of Men and Machines 10-A..... 2.00
Motion picture. 30 min. B & W. 16mm.
Investigates human behavior in highly complex man-machine systems. Shows ways man processes information and handles the dynamics of information feedback between man and machines.
Available from: OCEP. Rental: 5.00.

Pattern, Purpose, and Prospect 7-A..... 4.00
Motion picture. 25 min. Color.
The film describes what a computer is and what it can do, and compares it with human capabilities. The social impact is discussed, with emphasis on the computer as a tool in various applications. The functional units of a computer are described, especially several out-put devices. The ALSOL 60 language is used as an example of a computer language. Several computer applications are shown, including simulation. The film is English, and makes several references to items of English life possibly unfamiliar to Americans, such as the "6th form," the highest level in their secondary schools.
Available from: BRCG. Rental: Free.

Plan for Improvement 10-A..... 3.41
Motion picture. 20 min. Color. 16mm
Tells what the flow process chart is, why it is used, where and when it is made, and who should make it and how. Discusses each major part of the chart.
Available from: MODT. Rental: 12.00

Response to the Challenge 10-A..... 2.00
Motion picture. 18 min. Color. 16mm.
Film discusses features of the 400 Electronic Accounting Machine.
Available from: NCRC. Rental: Free.

Right of Privacy 10-A..... 1.24
Motion picture. 59 min. Color. 16mm.
Picture takes the stand that the proposed National Data Center is a danger to every American citizen.
Available from: UCAL. Rental: 16.00

Appendix A (Cont.)

School Information Center 10-A..... 1.12
Motion picture. 11 min. Color.
This film contains discussion areas of application of data processing in schools. Included are student records, such as individual cumulative file, report cards, schedules, and class listings. Census, counselors' back-up information, and school district business applications are also covered.
Available from: INBM. Rental: Free.

Systems 10-A..... 1.12
Motion picture. 14 min. B & W. 16mm
Gives simple explanation of how complex computers serve government, science and industry. Problems range from airline reservation systems to ground control of manned space flight.
Available from: INBM. Rental: Free.

Time Sharing 10-A..... 5.32
Motion picture. 30 min. B & W. 16mm
Describes time sharing program system developed at Systems Development Corp. It is a well done explanation, clear and straightforward. Time sharing is defined, along with a discussion of its value, the motivation for it, and objections of time sharing in problem solving. Aircraft interception is used as an example to show how a user enters and uses the system. The TINT language is defined.
Available from: WESE. Rental: Free.

2001 7-A..... 1.20
Motion picture. 25 min.
Walter Cronkite narrates this film showing the world of tomorrow and the way the computer is a help and an essential in the house.
Available from: RARI. Rental: Free

Universal Machines 10-A..... 1.14
Motion picture. 30 min. 16mm.
Computer and the mind of man series. The capability of the computer to do whatever man is capable of instructing it to do, limited only by man's ability

to feed it with data and instructions.
Available from: LIED, OCEP. Rental: 5.00

What's EDT 10-A..... 3.22, 2.20
Motion picture. 13 min. Color. 16mm.
Discusses basic principles of electronic data processing. Explains input, storage, processing and output of data.
Available from: INBM. Rental: Free.

You and the Computer 9-12..... 2.10
Motion picture. 9 min. Color. 16mm.
Uses live action and animation to focus on an item that is close to you, issuance of a paycheck. Terms, input, storage, calculation, output, and control are clearly defined and demonstrated.
Available from: MCID. Rental: Free

Zero Hour 10-A..... 1.30
Motion picture. 15 min. Color. 16mm.
The steps taken by several young people from their initial interest in the computer field as a career, which leads them to enrollment at a nearby Control Data Institute; followed by the various phases of classroom instruction with on-site computer training, to completion of their computer programming and technology courses, and the opportunities awaiting each graduate.
Available from: CDCO. Rental: Free.

Appendix A (Cont.)

Sources for Materials

BELT Bell Telephone Laboratories
(Contact your local P.N.W.B. Office)

BUEF Business Education Films
5113 16th Street
Brooklyn, New York

CDCO Control Data Corp.
8100 S. 34th Avenue
Minneapolis, Minn. 55420

CINW Computer Instruction Network
4924 River Rd., N.
Salem, OR 97303

INBM International Business Machines
(Check with your local IBM Office)

LIED Lane County I.E.D.
Instructional Materials Center
748 Pearl Street
Eugene, OR 97301

MCID Multnomah Co., I.E.D.
220 S.E. 102nd
Portland, OR 97216

MODT Industrial Management Society
c/o Modern Talking Film Service
P.C. Box 1005
Melrose Park, Illinois 60161

NASA Nasa Ames Research Center
Moffett Field, CA 94035

NCAR National Career Center
3839 White Plains Rd.
Bronx, N.Y. 10467

Appendix A (Cont.)

NCRC National Cash Register Co.
Audio Visual Services
Dayton, Ohio 45409

OCEP Oregon State A.V. Section
Division of Continuing Education
Coliseum 131
Corvallis, OR 97331

RANC Rand Corporation
1700 Main Street
Santa Monica, CA 90406

RARI Rarigs, Inc.
200 W. Mercer
Seattle, Washington

UCAL University of California
Extension Media Center
2223 Fulton St.
Berkeley, CA 94720

UNIW University of Iowa
Audio Visual Center
Div. of Extension & Univ. Services
Iowa City, Iowa 52240

USNA U.S. Navy Public Affairs Office
13th Naval District
U.S. Naval Air Station
Seattle, WA 98115

UVAC Univac Division
Sperry Rand Corp. Film Library
P.O. Box 500
Blue Bell, PA 19422

WESE Western Electric Co.
Motion Picture Bureau
195 Broadway
New York, N.Y. 10007

APPENDIX B

This appendix is provided to assist teachers in locating existing simulations relevant to specific courses to accomplish the following objectives: 2.31 to 2.34, 3.31 to 3.34, 4.21 and 5.21. The list of simulations and aids is being updated on a continuing basis and teachers should inquire about additional programs.

Refer to "WANT GENERAL PROGRAM LIBRARY" manuals for programs in mathematics, statistics, engineering and finances.

Available programs are listed alphabetically under subject areas.

I. Business

FAST
This is a typing game which tests your speed and accuracy.

MARKET
This is a computer-based game of competition between two companies selling the same type of product. Allows the users to explore and discover appropriate marketing strategies with respect to production, pricing, and advertising.

II. Computer Science

ANSWER
Answer is used to obtain responses to "gripe" messages.

DIRECT
This program can be used to obtain a catalog of the files on a user code.

EDIT
This is an all-purpose file editor, especially good for data files.

EDIT 8
This is a file editor, used for basic-plus files.

EDIT 20
This is a file editor, which can either find or replace all occurences of a given string.

FANNY
This program will punch files on paper-tape allowing the tape to be fanfolded.

GRIPE
This program permits the user to communicate with the staff at the center.

LIBRAR
This program aids the user in finding a program and can supply him with a list of all the available programs.

LOGIN
This program permits the user to "login" on the system. This program can only be run when a user types "Hello."

LOGOUT
This program allows a user to properly log-off the computer. This program can only be run when a user types "Bye."

PIP
This program is an all-purpose file handler.

QUOLST
This program tells the user his current disk quota and the system free count.

RESEQ
This program will resequence the line numbers of a program as specified by the user.

SYSTAT
This program gives the user statistics on the current status of the system.

TTYSET
This program is used to set terminal characteristics for the user's terminal.

III. Foreign Language

FRENCH
Given the masculine singular form of any French adjective this program will give the feminine singular, masculine plural, and feminine plural forms of the adjective.

IV. Language Arts

EDBARD
This program generates random poetry.

V. Mathematics

A. Algebra

BOUNDS
This program will find the interval which contains all the real roots of any polynomial equation up to the 20th degree.

CURFIT
This program performs a least squares curve fit to the following functions:

```
1)  Y = A + B(X)          2)  Y = A + EXP (B + X)
3)  Y = A + (X - B)       4)  Y A + B / X
5)  Y = 1 / (A + B + X)   6)  Y = X / (A + B + X)
```

CXARTH
This program will perform addition, subtraction, multiplication, and division on vectors expressed in either cartesian or polar systems.

Appendix B (Cont.)

CXEXP
This program will raise any real or complex number to any real or complex power.

FNCTS
This program will calculate the sin, cos, tan, sinh, cosh, and tanh of a complex number.

GSIMEQ
This program solves general simultaneous linear equations for any number of variables and equations.

LINFIT
This program computes the best linear fit and correlation for a set of independent variables to a dependent variable.

POLY
This program accepts X-Y data pairs and a polynomial degree and approximates a function to best fit the data.

QUADRT
This program determines the nature of the graph of the equation $AX^2 + BXY + CY^2 + DX + EY + F = 0$

ROOTER
This program finds the roots of a polynomial equation of one variable.

SUB
This is a game in which you are captain of a destroyer trying to sink an enemy submarine.

SQRS
This program expresses an integer as the sum of four squares.

SQRT
This program finds the square root of any positive numbers less than one million by "pinching" it within a smaller and smaller interval.

Appendix B (Cont.)

B. Applied Math

GINTLP
This program will solve linear programming problems in which all variables are restricted to values of either one or zero.

C. Calculus

CVAREA
This program evaluates the definite integral of F(X) from X=A to X=B by four different methods.

INTEG
This program finds the numeric integral of a function by Simpson's rule and the Romberg method.

LIMSIN
This program demonstrates that the limit of sin (x)/X, as X approaches 0, provided that x is measured in radians.

SLOPE
This program will approximate the derivative at X=A in the interval (A, A+1) through secant slopes.

D. General Math

ARITH
This program is a drill in one and two digit multiplication.

CALC 2
This program performs extended precision arithmetic operations on an imaginary calculator with a limit of 100 digits.

CONVER
This program performs English to metric and metric to English conversions.

FACTRL
This program will print out the factorial of a number.

GCD
This program finds the greatest common divisor of two or more numbers.

PRIFA
This program will find the prime factors of a number.

SAUCER
This is a game in which the user tries to shoot down the enemy spaceship.

SETS
This program finds the intersection and union of any two numerical sets.

E. Geometry

P12
This program computes the area of a circle and "PI" by using the areas of inscribed and circumscribed polygons.

SAT
This program will solve for the remaining parts of a triangle given three parts.

PLOTTING
No description given.

FGRAPH
This program graphs from one to five functions simultaneously in an interval between two points.

PLOT 03
This program will plot sets of ordered pairs.

F. Statistics

ANVAR 1
This program computes an analysis of variance table for

ARGEOM
This program computes the geometric mean and standard

deviation along with the arithmetic mean, median, and standard deviation of up to one hundred numbers.

CHISQR
This program computes chi-square statistics for any number of "m" by "n" contingency tables.

MINITA
A statistical computing program for students and researchers.

REGCOR
This program performs simple regression and correlation analysis on a series of observations of the values of two variables.

TTEST
This program calculates the mean and standard deviation for each of two samples and then compares the means using the assumption of equal variance, unequal variance or pairing of data.

VI. Science

A. Biology

DROS
This program determines the genetic characteristics of the offspring of a pair of drosophia flies.

ENZYME
This program discusses enzymatic reaction rates and conveys the idea that enzyme reactions are dependent upon environmental factors.

EVOLU
This program studies evolution by observing a population of light and dark peppermoths over a thirty year period.

GAMGN
This program is a review of the process of gametogenesis, applying it to the concept of dominant and recessive traits.

Appendix B (Cont.)

GENE 2
This program simulates a genetics lab in which you may study up to twenty different traits, each with up to twenty different variations.

HARDY
This program instructs the user about the Hardy-Weinberg principle and its applications.

PH
This program examines the theory that Ph specificity can be traced to the behavior of ionizable amino acids present at the active site.

B. Biology Lab

LOCKEY
This program is a study of competitive inhibition of the enzyme acetylocholinesterase for application to the lock and key model.

MEMBR
This program looks at membrane characteristics by simulating an experiment on diffusion.

PHOSYN
This program investigates changes in the rate of photosynthesis when carbon dioxide and light intensity are varied.

C. Chemistry

ATWT
This program calculates the atomic weight of an element.

AVOGA
This program calculates Avogadro's number.

EMPIR
This program calculates the empirical formula of a compound.

EQUIL
This program calculates the effect of concentration charges on two equilibrium systems.

KINET
This program calculates equilibrium concentrations.

MASSD
This program investigates and calculates the mass defect of an element.

PHPOH
This program computes the PH, POH, and percent dissociation for any weak monoprotic acid.

PRCNT
This program calculates the percent composition of a compound.

STOICH
This program solves mass-mass, mass-volume, and volume-volume problems.

D. Chemistry Labs

ACBAT 1
This program calculates molarity of a base, molecular weight of an acid, and percent acetic acid in vinegar, acid, or base.

AGECU
This is an investigation into the area of electrolysis.

CALOR 1
Calorimetry experiments are simulated by permitting the user to enter masses and temperatures of two quantities of water.

CONMA 1
Calculations are done involving conservations of mass in a chemical change.

CUAGMO
The calculations are done for a laboratory experiment in electrolysis of a copper-silver nitrate reaction.

Appendix B (Cont.)

CUFEM 1
This program does the calculations for a lab which determines the mole ratio of iron and copper.

FESCN
This program does calculations based upon the user's four ratios from the "Fescn" chemical equilibrium lab.

GASER 4
This program deals with calculations involving equal masses of three different gases.

HCMG 1
This program does calculations for the heat of combustion of magnesium.

HEAT 1
Calculations are done from the data collected from an experiment involving a water bath used to heat-sink a burning candle and melted wax.

HESS 1
This program calculates the results for a lab on the heat of reaction.

HYDRA 3
This program does calculations for a lab experiment dealing with hydrates.

ICER 1
This program is used in performing the calculations for a lab which determines the energy needed to melt ice.

MGHCL 1
This program considers the reaction of magnesium with hydrochloric acid.

MOLAR
This program calculates molarity by using data obtained from an acid-base titration.

Appendix B (Cont.)

E. Earth Science

CLIMAT
This program gives the user practice in identifying climates and climatic patterns.

CLOUDS
This program tests the user's ability to solve problems related to the formation of cumuliform clouds.

SPHERE
This program solves spherical triangles that have their apex at the north pole and two other corners defined by their respective latitude and longitude.

SUNSET
This program determines sunrise and sunset times for a given week.

WATER
This program will show the user how to calculate a water budget.

WEATH
This program attempts to predict tomorrow's weather based on statistics from the preceding two days.

F. Ecology

BUFLO
A simulation of the natural life cycle of the buffalo provides a context for the manipulation and study of population patterns and resource management.

LIFE
This is a game which simulates the rate of population growth of a biological community according to a set of simple genetic rules.

MALAR
The user attempts to control a malaria epidemic while studying the biological economic, social, political, and ecological aspects of this world health problem.

POLUT
The interaction between water and waste is simulated, providing a context within which the user can control specific variables which affect the quality of a water resource.

POP
This program allows exploration of three simple models of population growth. The primary species of study is the gypsy moth.

RATS
A simulation of the rat population in either a city or an apartment house with the environment and population control techniques entered by the user.

STERL
This program is a computer simulation designed to make possible an investigation of the effectiveness of two different methods of pest control: Pesticides and release of sterile male flies.

TAG
The user investigates the size of a wildlife population through the technique of tagging and recovery. The study population is the large-mouthed bass.

USPOP
This program is a flexible human population model. The user can investigate the effects of fertility, age of mother at birth of child, sex ratio of the offspring, and age-dependent mortality on population size and structure.

G. Physics

BFIELD
This program investigates the magnetic fields produced by current carrying conductors

Appendix B (Cont.)

BOHR
This program investigates the Bohr atom and how emission spectra are formed.

CHARGE
This program is a simulation of the Millikan oil drop experiment.

DECAY 1
Radioactive decay is treated pseudo-quantitatively by permitting the user to determine the approximate number of radioactive particles remaining after various times.

DECAY 2
This program will calculate half-life and mass of a radioactive sample.

EFIELD
This program calculates electric field strength

KINERV
This program provides a review of kinematics, specifically projectile motion.

NEWTN 2
This program presents a problematic situation which requires repeated applications of Newton's Second Law.

PHOTON
This program is designed to promote a better understanding of how energy levels are determined.

PRJTL
This program calculates the coordinates, vertical and horizontal velocities, and speed of a projectile.

REFLCT
An analogy is given for a light-ray reflected from a plane surface to demonstrate the "least-time" principle.

SCATR
This program simulates alpha particle scattering as demonstrated in the laboratory.

SNELL
Snell's Law is presented pictorially by plotting the path of a light ray as it crosses a boundary separating two different media.

SPACE
The effects of speed on orbital motion are demonstrated.

VFIELD
This program prints a picture of the relative potential field strengths in the region surrounding two point charges.

H. Physics Lab

LENSES
This program will solve lens problems. It can solve for focal length, object distance, image distance, object size or image size.

PHOTEL
An experiment involving the photoelectric effect is simulated by the computer, to enable the user to develop a qualitative understanding of the phenomenon.

PLANK
This is a simulation of the experiment to determine Plank's Constant, threshold frequency and the work function of a metal.

SLITS
This is a simulation of Young's double-slit experiment demonstrating interference patterns for light. The computer permits greater flexibility for variation and investigation of parameters.

Appendix B (Cont.)

VII. Social Science

A. Economics

BALANC
This program emphasizes the important distinction between balance of trade and balance of payments.

CIRFLW
This program is a simulation of the circular flow of goods, services, and money between business and the consumer in a free enterprise economy without government control.

CONSMP
This program simulates economic depression and equilibrium as effects on consumption.

GNPSUM
This program prints a summary of figures for GNP, Consumption, Investment, and Government spending for a series of consecutive years.

INOUT
A hypothetical economy is divided into a certain number of industries, and is analyzed as to the inter-industry flows of goods and services over a period of time.

LABOR
This program is designed to simulate a strike and the ensuing bargaining between labor and management.

MANAGE
This is a business management simulation exercise allowing three teams of students to act as business executives making periodic high level decisions for their firms. (Good follow-up activity for MARKET simulation)

MARKET
This is a computer-based game of competition between two companies selling the same type of product. Allows the

users to explore and discover appropriate marketing strategies with respect to production, pricing, and advertising.

ONIONS
The cobweb model for supply and demand is illustrated based upon current prices and quantity within the American onion market.

B. General

ECPRES
This program is a computer system for selective retrieval and analysis of large date files in the social sciences.

ECPSUR
This program will put reformatted Opscan data into "Expres" file format.

ECPSUV
This program enables the user to create variable names and descriptions for an "Ecpres" study.

FORMAT
This program will put raw Opscan data into the format necessary for "Ecpsur."

POP
No description available.

USPOP
No description available.

Also see statistics list under mathematics

C. History

CIVWAR
The Civil War is relived with the user controlling the resources of the South and possibly commanding the Confederacy to a victory.

ELECT 1
Based on historic elections from 1828-1896, the uer will allocate resources toward party, image, and policies in an effort to get his candidate elected.

ELECT 2
Based on historic elections from 1920-1968, the user will allocate resources toward party, image, and policies in an effort to get his candidate elected.

ELECT 3
The campaign for the presidency is divided into periods with the roles of candidate, campaign manager, special advisor, speechwriter, media expert, and fund-raiser, being assumed by the users who will attempt to allocate their resources in order to elect their candidate.

D. Political Science and Law

COMMUNE
This is a simulation in which you have been elected premier of a small communist island and must try to remain in power.

ELECT 1)
ELECT 2) - See descriptions under "C. History."
ELECT 3)

GVOTE
This simulation determines the probability that a committee will have transitive preferences among mutually exclusive alternatives using majority votes.

JUDGE
This is a judicial process simulation in which the user plays the role of the defense attorney in a court trial.

MASPAR
This program contains a model that illustrates the

relationship that exists in a society between social status and organizational involvement on the one hand and mass political participation on the other.

POLICY
This is a simulation of interest groups, specifically focusing on the public policy enacted by the government.

POLSYS
This is a simulation of the processes which groups and individuals use in an effort to influence city hall.

E. Psychology

ROBOT
This program enables you to influence the personality of a robot.

VIII. Teacher Aids

DRILL
This is a general, all-purpose drill program.

TDRILL
This program aids the teacher in developing a lesson to be used with the program "Drill."